

- GREER, C. A.; STEWART, W. B.; TEICHER, M. H.; SHEPHERD, G. M. (1982): Functional development of the olfactory bulb and a unique glomerular complex in the neonatal rat. *J. Neuroscience* 2, 1744–1759.
- HUDSON, R.; DISTEL, H. (1986): Pheromonal release of suckling in rabbits does not depend on the vomeronasal organ. *Physiol. Behav.* (Im Druck).
- HINDS, J. W. (1968): Autoradiographic study of histogenesis in the mouse olfactory bulb. I. Time of origin of neurons and neuroglia. *J. Comp. Neurol.* 134, 287–304.
- PEDERSEN, P. E.; BLASS, E. M. (1981): Olfactory control over suckling in albino rats. In: *Development of perception*. Ed. by R. N. ASLIN, J. R. ALBERTS, M. R. PETERSEN. New York, London, Toronto, Sydney, San Francisco: Vol. 1, pp. 359–381.
- PEDERSEN, P. E.; STEWART, W. B.; GREER, C. A.; SHEPHERD, G. M. (1983): Evidence for olfactory function in utero. *Science* 221, 478–480.
- SCHÄFER, H. J. (1983): Elektrophysiologische Untersuchungen zur ontogenetischen Entwicklung der olfaktorischen Sekundärneurone bei der Labormaus. Diss. Bonn.
- SCHMIDT, U.; ECKERT, M.; SCHÄFER, H. J. (1983): Untersuchungen zur ontogenetischen Entwicklung des Geruchssinnes bei der Hausmaus (*Mus musculus*). *Z. Säugetierkunde* 48, 355–362.
- TEICHER, M. H.; SHAYWITZ, B. A.; LUMIA, A. R. (1984): Olfactory and vomeronasal system mediation of maternal recognition in the developing rat. *Developm. Brain Res.* 12, 97–110.

Anschriften der Verfasser: Prof. Dr. UWE SCHMIDT, Dr. CHRISTEL SCHMIDT, Zoologisches Institut der Universität, Poppelsdorfer Schloß, D-5300 Bonn; Dr. CHARLES J. WYSOCKI, Monell Chemical Senses Center, 3500 Market Street, Philadelphia, USA

Distribution of the Common hamster (*Cricetus cricetus* L.) in The Netherlands

By A. LENDERS and E. PELZERS

Natural History Society, Maastricht, The Netherlands

Receipt of Ms. 13. 5. 1985

Abstract

Studied was the distribution of the common hamster *Cricetus cricetus* in The Netherlands. When compared to earlier inventories, there is definitely an extension of area. One may nevertheless not conclude that the number of common hamsters in The Netherlands has increased. Due more especially to the modified use of space, there is a decline in suitable biotopes for common hamsters. The measure of density in which common hamsters occur seems to have been substantially reduced since 1915. Only a more stringent protection of biotopes will be able to preserve the common hamster for The Netherlands.

Introduction

The first time the common hamster (*Cricetus cricetus* L.) is mentioned in The Netherlands dates back to 1842. SELYS-LONGCHAMPS reports the presence of the common hamster in the neighbourhood of Venlo, about 30 kilometers to the north of the present distribution area (HUSSON 1949). Up till now this report could not be verified. It was not until 1879 that the presence of the common hamster could be established beyond doubt. Mr. VAN BEMMEL reports on the presence of the animal in Southern-Limburg (HUSSON 1949) during a meeting of the Dutch Zoological Society.

During the last decennia of the 19th century the number of common hamsters in Limburg increased tremendously. The probable cause of this increase is the dominant position of grain-cultivation in the southern part of the province and a higher harvest-yield through the use of improved seedlings and a more effective method in the use of fertilisers (PELZERS et al. 1984). Soon the damage done to agricultural crops leads to payment of bonusses for trapped or dead animals. In 1889 the population of the municipality of Wylre tops the list by handing in 984 common hamsters.

Basing himself on such recorded data HUSSON (1949) composes the first distribution-survey of the common hamster in The Netherlands. The centre of the common hamster-area practically comprises the whole of Southern-Limburg. Apart from this a few reports are secured from the mid-province. However, because not all municipalities in Limburg had been involved in the inquiry and because a number of municipalities had not responded positively to the inquiry-forms, this research rendered an incomplete picture. Only in the early sixties another common hamster inventory is made, this time also basing itself on fieldwork (VAN MOURIK 1962; VAN MOURIK and GLAS 1962).

Remarkable in this inventory is that the distribution-area is hardly different from the one of HUSSON (1949), and that it observes that the common hamster has alarmingly dropped in numbers. The main reason for this decrease in number is considered to be modern harvesting methods and the pursuit of the animals by farmers. There is even a proposal to establish common hamster reserves.

Little attention is paid to the animal until 1980. In several reports one presupposes that the situation as regards the survival of the species in The Netherlands is extremely critical (VAN WIJNGAARDEN et al. 1971; VAN MOURIK and DE MOLENAAR 1978; HANEKAMP 1979; VAN WIJNGAARDEN 1983). This amongst other things results in the situation that in 1973 the common hamster becomes legally protected in The Netherlands.

In 1980 reports suggest that there is a common hamster population in the Roer-area, Mid-Limburg (LENDERS 1981). This led to an extensive research into the distribution of the animal species in the northern part of its area (LENDERS and PELZERS 1982). It was established that the common hamster in that particular locality of Mid-Limburg is reasonably common. In order to explain the obvious increase in the Roer-area, a broad ecological study was set up, in which the abiotic factors which influence the distribution of the animal took a central place (PELZERS and VAN DER REEST 1984; LENDERS 1985). As the rediscovery of the common hamster in Mid-Limburg increased the surmise that the situation in Southern-Limburg might also have changed radically, another common hamster-census in The Netherlands was held in 1980. This article presents its results.

Methods

The research took place from 1980 to 1984. During this period the authors collected distribution-data about the common hamster throughout The Netherlands.

An inquiry

Farmers who happened to be at work on their farms were interviewed about possible tips regarding the presence of the common hamster. Afterwards a critical check was run on the obtained information amongst others by specific questions. Whenever possible the indicated locations were also scrutinized. Information was furthermore obtained from Conservation of Natural Beauty-organizations and police-stations.

Study of archives

Relevant data were also collected through a study of archives of the Natural History Musea in Leiden, Amsterdam and Maastricht, the State Forest Service and the Natural History Society in Limburg. The

State Forest Service receives an annual survey of mammals observed by its reserve-keepers. The Natural History Society collects for some years already distribution-data of mammals observed in the most southern province of The Netherlands.

Field-research

After crops have been harvested (cereals and tuberos plants) the fields were investigated to track traces of habituation. The common hamster builds a striking burrow with characteristically and slanting funnels and a large earthpile. This method of field-inventory in The Netherlands has proved to be the most effective means in obtaining common hamster inventories till now. Thorough inventories on the basis of observations of different footmarks are practically impossible in The Netherlands. Trails, forage tracks and excrements are difficult to find because of the poor concentration of the animals. Visual observations are only incidental because the animal leads a nightlife. In order to obtain a reliable distribution-survey of the common hamster in The Netherlands a combination of the above-mentioned methods seemed imperative.

The data thus collected were mapped according to the so-called (shifted) Amersfoort coordinating system. In this method a transparent screen is superimposed on the topographical map of The Netherlands with the kilometer-square forming its smallest unit (BOERE 1981). This screen is amongst other things used for national inventories of plants, mammals and birds.

Results

The results of the inventory are reproduced in Fig. 1 and 2. In the draft of the distribution-survey by VAN MOURIK and GLAS (1962), Fig. 1, the difficulty presented itself in the fact that both researchers collected data per municipality at the time. In a limited number of cases their published observations could hardly be transposed on the screen of the kilometer-units. In order to show the data as faithfully as possible, we have also gratefully made use of the workmaps of the authors also as regards Mid-Limburg.

The distribution-data rendered by our own research are divided into two groups; data of 1970 up to and including 1979, and from 1980 up to and including 1984 as up-to-date as possible. Kilometer-units in which reports are known periodically, have been included in the last group. For a detailed description of all reports we can refer to a workreport (LENDERS and PELZERS 1985).

Discussion

Distribution in The Netherlands

In comparing Fig. 1, the research by VAN MOURIK and GLAS (1962), with Fig. 2, the recent study, a striking difference presents itself. By the recent research more data have become available than by the study by VAN MOURIK and GLAS (1962), which can be deduced from the higher score with regard to the number of kilometer-units, in which the common hamster occurs. However, one may not conclude from this that the number of common hamsters in The Netherlands has actually increased. The study by VAN MOURIK and GLAS (1962) on the contrary does not seem to have been complete.

Some places, which are mentioned by HUSSON (1949) are not to be found with VAN MOURIK and GLAS (1962). Recently burrows of the common hamster have been discovered again in these places (amongst others in unit 60-12, and in the units 61-17, 61-27 and 61-37). In several places (amongst others 60-14, 60-42 east and 60-15) burrows of the common hamster were found, which are not mentioned in former studies (HUSSON 1949; VAN MOURIK and GLAS 1962), whilst elderly residents recall that the common hamster was around for a long time already. This forces us to conclude that the distribution area of the common hamster in The Netherlands at the particular time of the study by VAN MOURIK and GLAS (1962) must have been more extensive than is apparent on the basis of their

results. One can assume that the common hamster has extended its habitat only towards the extremest north of its Dutch distribution area (LENDERS and PELZERS 1982). The common hamster definitely disappeared in two areas, namely 60-42 west, 60-32 and 62-15.

In conclusion we can state that the distribution of the common hamster in The Netherlands is still confined to Mid- and Southern-Limburg (cfr. also NIETHAMMER 1982).

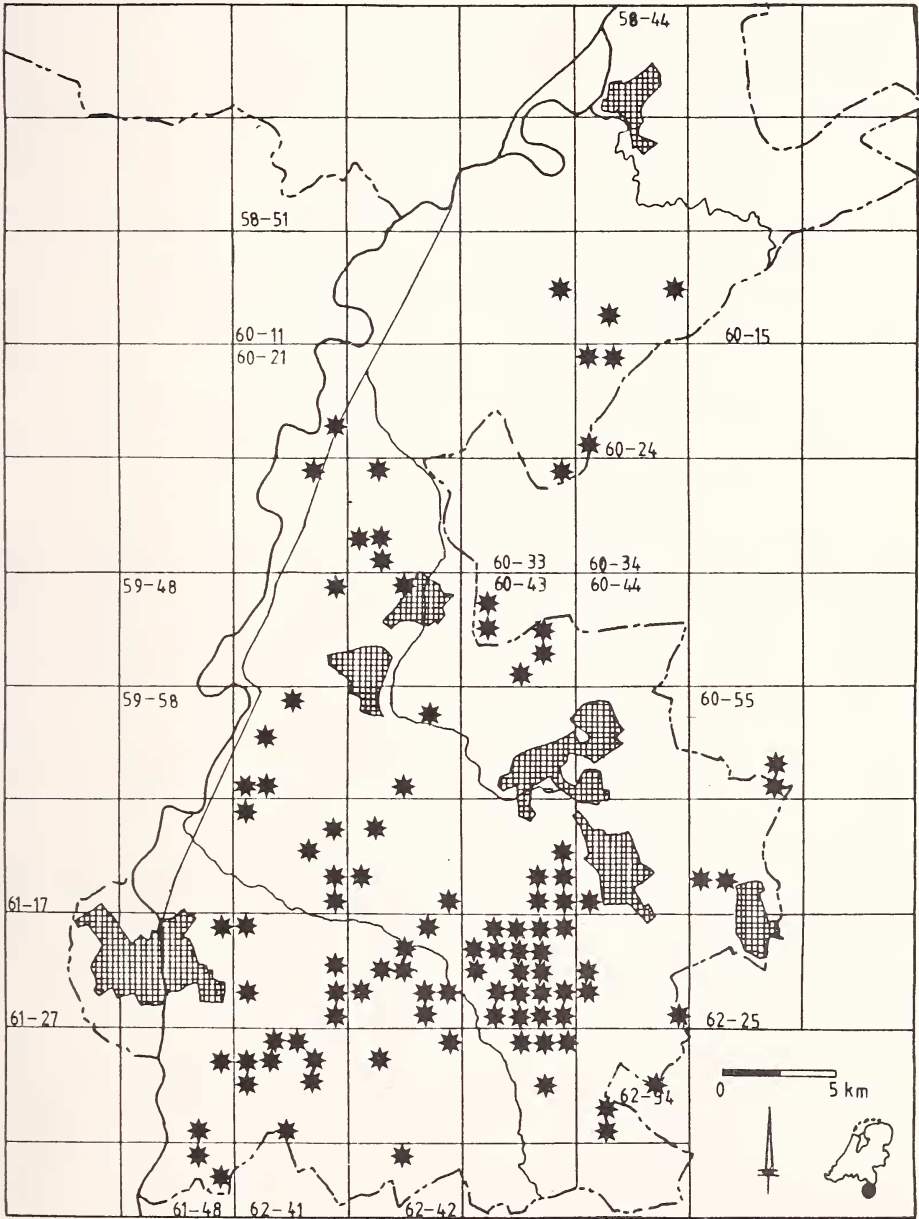


Fig. 1. Distribution of the common hamster in The Netherlands in the early sixties (after VAN MOURIK and GLAS 1962). ★ = kilometer-units, in which the common hamster was noticed.

Despite inquiries and research the animal could not be traced anymore to the north of Roermond (unit 58-44). The most northern report probably refers to a roaming animal and dates back to 1979 (LENDERS 1983).

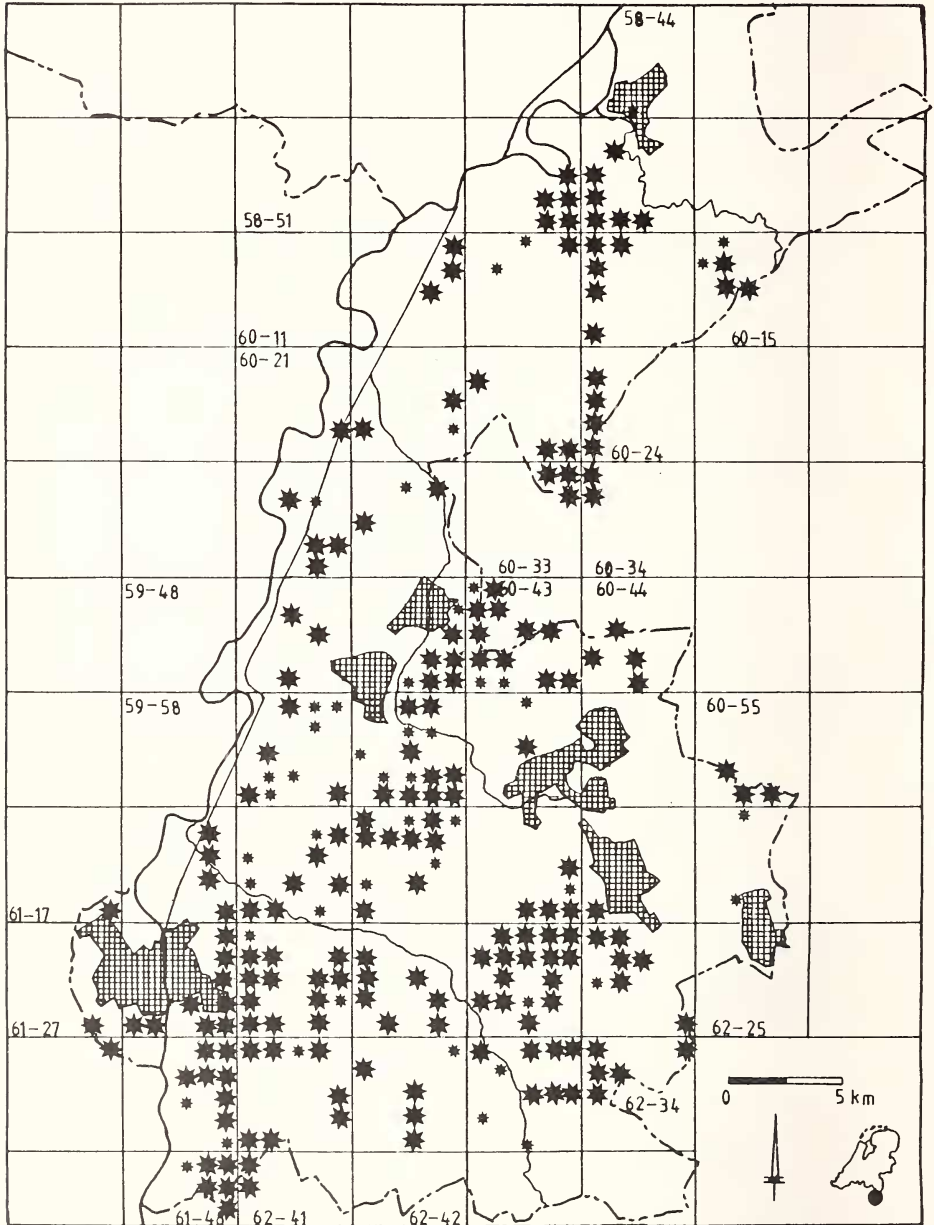


Fig. 2. The recent distribution of the common hamster in The Netherlands. * = kilometer-units, in which the common hamster was noticed during the period 1970-1979; ★ = kilometer-units, in which the common hamster was noticed during the period 1980-1984

Threats

In Europe there is a dualistic situation regarding the population dynamics of the common hamster. In Czechoslovakia (GRULICH 1980), Yugoslavia (RUZIC 1977) and Hungary (NECHAY et al. 1977) there have been reports of vast numbers over the past few years, which can cause great damage. On the contrary the number of common hamsters are dwindling, amongst others in Eastern Germany (PIECHOCKI 1979), West-Germany (NIETHAMMER 1982), U.S.S.R. (GRULICH 1980), Belgium (LIBOIS and ROUSOUX 1982).

Since the beginning of this century the number of common hamsters in The Netherlands has gradually dropped. The common hamster-plagues which still occurred round the turn of the century, practically stopped after 1915 (HUSSON 1949; PELZERS et al. 1984). The farmers who were interviewed also report that the common hamster was observed more rarely than used to be the case in former days.

From recent data it becomes evident nevertheless that the common hamster in The Netherlands is not threatened by extinction yet. Legal protection of the animal in The Netherlands however does not guarantee the preservation of the species. This legal protection implies that it is forbidden to disturb, catch or kill the common hamster. Disturbing the burrows is also prohibited by law. The biotope of the species on the other hand is hardly protected, despite the fact that the Dutch Government has ratified the Bern Convention.

In The Netherlands there are a number of anthropogenic factors which influence the occurrence of the common hamster.

1. The changing exploitation of space

Most of the common hamster burrows have been found in recent research on grain-fields (wheat, rye, barley). To a less extent also in potato- and beetfields. Incidental reports refer to among others maizefields, vegetable gardens and roadbanks. PELZERS et al. (1984) have already drawn attention to the decline of suitable biotopes for common hamsters in the beginning of this century by the shift from cultivated land to grassland. The common hamster in The Netherlands shuns grassland, especially in case of low density (PELZERS 1983). Nowadays several farm areas, which are known to be habitats of the species, are threatened by expanding residential areas, industries and marlpits, and several motorways. The rapid rise of maize has a double effect on the common hamster. On the one hand the amount of forage increases. One regularly observes forage-tracks of the common hamster in maizefields. On the other hand possibilities for a habitat for the animals deteriorate by it. Over the past few years only a small number of burrows have been found in maizefields. The heavy machinery used for harvesting the maize, and the large volume of liquid manure could well be the culprits. The rather late sowing of the maize can work adversely. The other cereals are already in an advanced stage of growth then, and offer the common hamster better shelter than the maize does.

2. Modified farm-management

According to WENDT (1984) early harvesting of the crop, mechanized tillage of the land, and professional hunting of the species in Eastern Germany are responsible for a marked decline. NECHAY et al. (1977) observe increase in the number of common hamster in Czechoslovakia as a result of the favourable forage situation, brought about by modern agricultural enterprise. As far as The Netherlands are concerned, the influence of agricultural management on the occurrence of the common hamster is still a matter of guesswork. Only after Worldwar II mechanized farming was realized. The decline of the common hamster had already started three decennia before that (HUSSON 1949; PELZERS et al. 1984).

This suggests that the mechanization of agriculture has played no determining role in the decline.

Acknowledgements

We are grateful to M. PETERS for his co-operation. The Ministry of Agriculture and Fishery, and the Heimans and Thijse Foundation subsidized this research project.

Zusammenfassung

Die gegenwärtige Verbreitung des Hamsters (Cricetus cricetus L.) in den Niederlanden

Im Vergleich zu früheren Bestandsaufnahmen hat sich das Hamsterareal in den Niederlanden offenbar etwas ausgedehnt. Dagegen dürfte die Gesamtzahl von Hamstern abgenommen haben. Infolge veränderter Raumnutzung haben geeignete Biotope abgenommen, und die Dichte hat sich seit 1915 erheblich verringert.

Literature

- BOERE, G. C. (1981): Inventarisatieatlas voor flora en fauna in Nederland. Utrecht: Staatsbosbeheer, Inspectie Natuurbehoud Wetenschappelijk Archief.
- GRULICH, I. (1980): Populationsdichte des Hamsters (*Cricetus cricetus*, Mamm.). Acta Sc. Nat. Brno 14, 1-44.
- HANEKAMP, G. (1979): De Roerstreek. Natuurbeheersaspecten van zoogdieren, vogels en herpetofauna. Leersum: Rijksinstituut voor Natuurbeheer.
- HUSSON, A. M. (1949): Over het voorkomen van de hamster, *Cricetus cricetus* (L.), in Nederland. Publicaties van het Natuurhistorisch Genootschap in Limburg 2, 13-54.
- LENDERS, A. (1981): De meest noordelijke populatie van de hamster (*Cricetus cricetus* [L.]) in Nederland begreid door de aanleg van Rijksweg 73. Natuurhistorisch Maandblad 70, 180-182.
- (1983): Hamstermelding uit Roermond. Natuurhistorisch Maandblad 72, 37-38.
- (1985): Het voorkomen van de hamster *Cricetus cricetus* (L., 1758) in relatie met textuur en bodemtype. Lutra 28, 71-94.
- LENDERS, A.; PELZERS, E. (1982): Het voorkomen van de hamster *Cricetus cricetus* (L.) aan de noordgrens van zijn verspreidingsgebied. Lutra 25, 69-80.
- ; — (1985): Verspreidingsonderzoek naar de hamster (*Cricetus cricetus* L.) in Nederland. St. Odiliënberg: Heemkundevereniging Roerstreek.
- LIBOIS, R. M.; ROSOUX, R. (1982): Le hamster commun (*Cricetus cricetus* L.) en Belgique: statut actuel et ancien des populations. Anns. Soc. r. zool. Belg. 112, 227-236.
- MOURIK, W. R. VAN (1962): De hamster, *Cricetus cricetus* (L.) in Nederland. Bilthoven: Rijksinstituut voor Veldbiologisch Onderzoek ten behoeve van het Natuurbehoud.
- MOURIK, W. R. VAN; GLAS, P. (1962): De hamster, *Cricetus cricetus* (L.) in Nederland. Bilthoven: Rijksinstituut voor Veldbiologisch Onderzoek ten behoeve van het Natuurbehoud.
- MOURIK, W. R. VAN; MOLENAAR, J. G. DE (1978): Werkrapport Mergelland vol. IX. Leersum: Rijksinstituut voor Natuurbeheer.
- NECHAY, G.; HAMAR, M.; GRULICH, I. (1977): The common hamster (*Cricetus cricetus* [L.]); a review. Eppo-Bulletin 7, 255-276.
- NIETHAMMER, J. (1982): *Cricetus cricetus* (Linnaeus, 1758) - Hamster (Feldhamster). In: Handbuch der Säugetiere Europas. Ed by J. NIETHAMMER, F. KRAPP. Wiesbaden: Akademische Verlagsgesellschaft. Band 2/1, 7-28.
- PELZERS, E. (1983): Nieuwe gegevens over de hamster (*Cricetus cricetus* L.) in Midden- en Zuid-Limburg. Huid en Haar 2, 63-65.
- PELZERS, E.; COENDERS, F.; LENDERS, A. (1984): Enige achtergronden van de toename van hamsters (*Cricetus cricetus* L.) in Zuid-Limburg 1879-1915. Natuurhistorisch Maandblad 73, 207-213.
- PELZERS, E.; REEST, P. J. VAN DER (1984): Over de invloed van reliëf en vegetatie op het voorkomen van de hamster *Cricetus cricetus* (L., 1758). Lutra 27, 157-169.
- PIECHOCKI, R. (1979): Über den Rückgang des Aufkommens an Hamsterfellen in der DDR. Brühl 20, 11-13.
- RUŽIĆ, A. (1977): Study of the population dynamics of common hamster (*Cricetus cricetus* L.) in Vojvodina. Zastita bilja 28, 289-300.
- WENDT, W. (1984): Zu den Auswirkungen ausgewählter agrotechnischer Maßnahmen und des Hamsterfangs auf die weitere Aufkommenshöhe an Hamsterfellen in der DDR. Brühl 25, 7-8.
- WIJNGAARDEN, A. VAN (1983): Hamster (*Cricetus cricetus*). In: Dieren. Natuurbeheer in Nederland. Wageningen: Pudoc.
- WIJNGAARDEN, A. VAN; LAAR, V. VAN; TROMMEL, M. D. M. (1971): De verspreiding van de Nederlandse zoogdieren. Lutra 13, 1-41.

Authors' address: A. LENDERS, E. PELZERS, Groenstraat 106, NL-6074 EL Melick, The Netherlands